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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,772	11/12/2003	Kohei Asada	7217/70980	7717

530 7590 03/23/2009

LERNER, DAVID, LITTENBERG,
KRUMHOLZ & MENTLIK
600 SOUTH AVENUE WEST
WESTFIELD, NJ 07090

EXAMINER	
SAUNDERS JR, JOSEPH	
ART UNIT	**PAPER NUMBER**
2614	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/706,772	ASADA ET AL.	
	Examiner	Art Unit	
	Joseph Saunders	2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 February 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 29, 2008 has been entered. Claims 1, 3, and 5 are currently pending and considered below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bienek et al. (WO 02/078388 A2), hereinafter Bienek, in view of Foster et al. (US 5,815,578), hereinafter Foster.

Claim 1: Bienek discloses a method of reproducing an audio signal (method and apparatus to create a sound field), comprising the steps of: supplying an audio signal (input signal 101) to a plurality of digital filters (delay means 1508 or adjustable digital

filter 1512 can also be arranged to apply delays), and producing a respective plurality of filtered signals; generating a sound field inside a closed space by supplying the plurality of filtered signals from the plurality of digital filters to a respective plurality of speakers constituting a speaker array (Description of Figure 6, Pages 18 – 19); and focusing reflective sounds outputted from one or more of the speakers of the speaker array to a location of a listener inside a sound field after being reflected by a wall surface of the closed space with a sound pressure greater than a sound pressure at a peripheral location in the closed space,

> "If the signal delay applied by the signal delay means (1508) and/or the adaptive digital filter (1512) is chosen such that the sum of the delay plus the sound travel time from that SET (104) to a chosen point in space in front of the DPAA are for all of the SETs the same value - ie. so that sound waves arrive from each of the output transducers at the chosen point as in-phase sounds - then **the DPAA may be caused to <u>focus</u> sound at that point, P**. This is illustrated in Figure 7C.
>
> As can be seen from Figure 7C, the delays applied at each of the output transducers (104a through 104h) again increase, although this time not linearly. **This causes a curved wave front F which converges on the focus point such that the sound intensity at and around the focus point (in a region of dimensions roughly equal to a wavelength of each of the spectral components of the sound) is considerably**

higher than at other points nearby," Third Sound Field, Pages 21 – 22 and Figure 7C.

"**The first aspect of the invention relates to the use of a DPAA in a multichannel system. As already described, different channels may be directed in different directions using the same array to provide special effects.** Figure 8 schematically shows this in plan view the array (3801) is used to direct a first beam of sound (B1) substantially straight ahead towards a listener (X). This can be either focussed or not as shown in Figures 7A or 7B. **A second beam (B2) is directed at a slight angle, so that the beam passes by the listener (X) and undergoes multiple reflections from the walls (3802), eventually reaching the listener again. A third beam (B3) is directed at a stronger angle so that it bounces once of the side wall and reaches the listener.** A typical application for such a system is a home cinema system in which beam B1 represents a centre sound channel, beam B2 represents a right surround (right rear speaker in conventional systems) sound channel and beam B3 represents a left sound channel. Further beams for the right channel and left surround channel may also be present but are omitted from Figure 8 for clarity. As is evident, the beams travel different distances before reaching the user. For example, the centre beam may travel 4.8m, the left and right channels may travel 7.8m and the surround channels travel 12.4m. To account for this, an extra delay can be

applied to the channels which travel the shortest distance so that each channel reaches the user substantially simultaneously," Page 24 Description of Figure 8.

It is noted that Figure 7C referenced above also illustrates focusing or directing sound as shown in Figure 7B and is also disclosed as achieving the first aspect of the present invention. Therefore Bienek clearly anticipates focusing sounds outputted from the plurality of speakers to a location of a listener inside a sound field after being reflected by a wall surface.

While Bienek further discloses said plurality of digital filters being defined such that the reflective sounds are focused at the location of the listener (Again Figure 7C and Figure 8) Bienek does not disclose that a sound pressure reduced point of direct sounds outputted from one or more of the speakers of the speaker array is at the location of the listener.

Bienek does disclose reducing "side lobes" of the sound beams by providing a window function to improve directivity. Foster teaches another method that does better than just reducing "side lobes" or "leakage" it cancels "leakage". Foster teaches "In one embodiment, the present invention provides a leakage canceling signal which cancels the surround sound leakage signal in the vicinity of listener 100 so that the perception of listener 100 that the surround sound signal is emanating from reflecting surfaces is improved. For the surround sound leakage signal, a leakage canceling signal is generated in the vicinity of the listener by applying a leakage transmission signal to a direct speaker. The leakage canceling signal effectively suppresses the surround sound

leakage signal so that it does not disturb the listener's perception. The leakage transmission signal is derived as described below from a measured transfer function which describes the transmission and propagation of the surround sound leakage signal to the vicinity of the listener and the transfer function which describes the transmission and propagation of a direct signal to the listener," Column 5 Lines 22 – 36 see also Figure 3 and Column 8 Lines 18 – 57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the transfer function, as taught by Foster, of the adjustable digital filters as disclosed by Bienek, thereby improving the directionality of the surround signal in the system of Bienek.

Claim 3: Bienek discloses an apparatus for reproducing an audio signal (method and apparatus to create a sound field), comprising: a plurality of speakers (output transducer 104) constituting a speaker array (array 105); and a plurality of digital filters (delay means 1508 or adjustable digital filter 1512 can also be arranged to apply delays) to which an audio signal (input signal 101) is supplied for producing a plurality of filtered signals, wherein a sound field is generated inside a closed space by supplying the plurality of filtered signals from said plurality of digital filters to said plurality of speakers, respectively (Description of Figure 6, Pages 18 – 19); and wherein reflective sounds outputted from one or more of the speakers of the speaker array are focused at a location of a listener inside the sound field after being reflected by a wall surface of the

closed space with a sound pressure greater than a sound pressure at a peripheral location,

"If the signal delay applied by the signal delay means (1508) and/or the adaptive digital filter (1512) is chosen such that the sum of the delay plus the sound travel time from that SET (104) to a chosen point in space in front of the DPAA are for all of the SETs the same value - ie. so that sound waves arrive from each of the output transducers at the chosen point as in-phase sounds - then **the DPAA may be caused to focus sound at that point, P**. This is illustrated in Figure 7C.

As can be seen from Figure 7C, the delays applied at each of the output transducers (104a through 104h) again increase, although this time not linearly. **This causes a curved wave front F which converges on the focus point such that the sound intensity at and around the focus point (in a region of dimensions roughly equal to a wavelength of each of the spectral components of the sound) is considerably higher than at other points nearby**," Third Sound Field, Pages 21 – 22 and Figure 7C.

"**The first aspect of the invention relates to the use of a DPAA in a multichannel system. As already described, different channels may be directed in different directions using the same array to provide special effects.** Figure 8 schematically shows this in plan view the array (3801) is used to direct a first beam of sound (B1) substantially

straight ahead towards a listener (X). This can be either focussed or not as shown in Figures 7A or 7B. **A second beam (B2) is directed at a slight angle, so that the beam passes by the listener (X) and undergoes multiple reflections from the walls (3802), eventually reaching the listener again. A third beam (B3) is directed at a stronger angle so that it bounces once of the side wall and reaches the listener.** A typical application for such a system is a home cinema system in which beam B1 represents a centre sound channel, beam B2 represents a right surround (right rear speaker in conventional systems) sound channel and beam B3 represents a left sound channel. Further beams for the right channel and left surround channel may also be present but are omitted from Figure 8 for clarity. As is evident, the beams travel different distances before reaching the user. For example, the centre beam may travel 4.8m, the left and right channels may travel 7.8m and the surround channels travel 12.4m. To account for this, an extra delay can be applied to the channels which travel the shortest distance so that each channel reaches the user substantially simultaneously," Page 24 Description of Figure 8.

It is noted that Figure 7C referenced above also illustrates focusing or directing sound as shown in Figure 7B and is also disclosed as achieving the first aspect of the present invention. Therefore Bienek clearly anticipates focusing sounds outputted from the

plurality of speakers to a location of a listener inside a sound field after being reflected by a wall surface.

While Bienek further discloses said plurality of digital filters being defined such that the reflective sounds are focused at the location of the listener (Again Figure 7C and Figure 8) Bienek does not disclose that a sound pressure reduced point of direct sounds outputted from one or more of the speakers of the speaker array is at the location of the listener.

Bienek does disclose reducing “side lobes” of the sound beams by providing a window function to improve directivity. Foster teaches another method that does better than just reducing “side lobes” or “leakage” it cancels “leakage”. Foster teaches “In one embodiment, the present invention provides a leakage canceling signal which cancels the surround sound leakage signal in the vicinity of listener 100 so that the perception of listener 100 that the surround sound signal is emanating from reflecting surfaces is improved. For the surround sound leakage signal, a leakage canceling signal is generated in the vicinity of the listener by applying a leakage transmission signal to a direct speaker. The leakage canceling signal effectively suppresses the surround sound leakage signal so that it does not disturb the listener's perception. The leakage transmission signal is derived as described below from a measured transfer function which describes the transmission and propagation of the surround sound leakage signal to the vicinity of the listener and the transfer function which describes the transmission and propagation of a direct signal to the listener,” Column 5 Lines 22 – 36 see also Figure 3 and Column 8 Lines 18 – 57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the transfer function, as taught by Foster, of the adjustable digital filters as disclosed by Bienek, thereby improving the directionality of the surround signal in the system of Bienek.

Claim 5: Bienek discloses an apparatus for reproducing an audio signal in a desired space (method and apparatus to create a sound field), said apparatus comprising: a plurality of speakers (output transducer 104) constituting a speaker array (array 105); and a plurality of digital filters (delay means 1508 or adjustable digital filter 1512 can also be arranged to apply delays) coupled directly or indirectly to a source (input signal 101) and respectively to said plurality of speakers, said plurality of digital filters having filter coefficients associated therewith ("It is noted that the ADFs can be arranged to apply delays to the signal by appropriate choice of filter coefficients," page 12 lines 3 – 4), said plurality of digital filters being operable to receive an audio signal from said source and to produce therefrom a plurality of filtered signals and to supply said plurality of filtered signals or signals corresponding thereto to said plurality of speakers so as to cause a sound field to be generated therefrom in the desired space (Description of Figure 6, Pages 18 – 19), and said filter coefficients having values such that reflective sounds outputted from one or more of the speakers of the speaker array are focused at a location of a listener inside the desired space after being reflected by a wall surface of the desired space with a sound pressure greater than a sound pressure at a peripheral location,

"If the signal delay applied by the signal delay means (1508) and/or the adaptive digital filter (1512) is chosen such that the sum of the delay plus the sound travel time from that SET (104) to a chosen point in space in front of the DPAA are for all of the SETs the same value - ie. so that sound waves arrive from each of the output transducers at the chosen point as in-phase sounds - then **the DPAA may be caused to focus sound at that point, P**. This is illustrated in Figure 7C.

As can be seen from Figure 7C, the delays applied at each of the output transducers (104a through 104h) again increase, although this time not linearly. **This causes a curved wave front F which converges on the focus point such that the sound intensity at and around the focus point (in a region of dimensions roughly equal to a wavelength of each of the spectral components of the sound) is considerably higher than at other points nearby**," Third Sound Field, Pages 21 – 22 and Figure 7C.

"**The first aspect of the invention relates to the use of a DPAA in a multichannel system. As already described, different channels may be directed in different directions using the same array to provide special effects.** Figure 8 schematically shows this in plan view the array (3801) is used to direct a first beam of sound (B1) substantially straight ahead towards a listener (X). This can be either focussed or not as shown in Figures 7A or 7B. **A second beam (B2) is directed at a**

slight angle, so that the beam passes by the listener (X) and undergoes multiple reflections from the walls (3802), eventually reaching the listener again. A third beam (B3) is directed at a stronger angle so that it bounces once of the side wall and reaches the listener. A typical application for such a system is a home cinema system in which beam B1 represents a centre sound channel, beam B2 represents a right surround (right rear speaker in conventional systems) sound channel and beam B3 represents a left sound channel. Further beams for the right channel and left surround channel may also be present but are omitted from Figure 8 for clarity. As is evident, the beams travel different distances before reaching the user. For example, the centre beam may travel 4.8m, the left and right channels may travel 7.8m and the surround channels travel 12.4m. To account for this, an extra delay can be applied to the channels which travel the shortest distance so that each channel reaches the user substantially simultaneously," Page 24 Description of Figure 8.

It is noted that Figure 7C referenced above also illustrates focusing or directing sound as shown in Figure 7B and is also disclosed as achieving the first aspect of the present invention. Therefore Bienek clearly anticipates focusing sounds outputted from the plurality of speakers to a location of a listener inside a sound field after being reflected by a wall surface.

Bienek does not disclose that a sound pressure reduced point of direct sounds outputted from one or more of the speakers of the speaker array is at the location of the listener.

Bienek does disclose reducing “side lobes” of the sound beams by providing a window function to improve directivity. Foster teaches another method that does better than just reducing “side lobes” or “leakage” it cancels “leakage”. Foster teaches “In one embodiment, the present invention provides a leakage canceling signal which cancels the surround sound leakage signal in the vicinity of listener 100 so that the perception of listener 100 that the surround sound signal is emanating from reflecting surfaces is improved. For the surround sound leakage signal, a leakage canceling signal is generated in the vicinity of the listener by applying a leakage transmission signal to a direct speaker. The leakage canceling signal effectively suppresses the surround sound leakage signal so that it does not disturb the listener's perception. The leakage transmission signal is derived as described below from a measured transfer function which describes the transmission and propagation of the surround sound leakage signal to the vicinity of the listener and the transfer function which describes the transmission and propagation of a direct signal to the listener,” Column 5 Lines 22 – 36 see also Figure 3 and Column 8 Lines 18 – 57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the transfer function, as taught by Foster, of the adjustable digital filters as disclosed by Bienek, thereby improving the directionality of the surround signal in the system of Bienek.

Response to Arguments

4. Applicant's arguments filed August 29, 2008 with regards to the provisional double patenting rejection under 35 U.S.C. 101 as claiming the same invention as that of claims 1, 2, 10, and 11 of copending Application No. 10/706,772 have been considered and are persuasive. The provisional double patenting rejection of claims 1, 3, and 5 has been withdrawn.

5. Applicant's arguments with respect to claims 1, 3, and 5 under 35 U.S.C. 102 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Saunders whose telephone number is (571) 270-1063. The examiner can normally be reached on Monday - Thursday, 9:00 a.m. - 4:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Kuntz can be reached on (571) 272-7499. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. S./
Examiner, Art Unit 2614
/CURTIS KUNTZ/
Supervisory Patent Examiner, Art Unit 2614